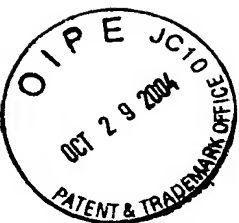


AF/1742  
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Application No.: 10/087,742

Docket No.: M1071.1711/P1711



Docket No.: M1071.1711/P1711  
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Hidekiyo Takaoka et al.

Application No.: 10/087,742

Filed: March 5, 2002

Art Unit: 1742

For: LEAD FREE SOLDER AND SOLDERED  
ARTICLE

Examiner: S. Ip

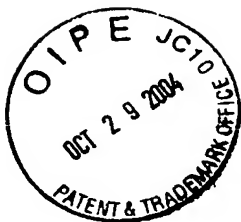
In response to the Action of October 19, 2004, submitted herewith in triplicate is a revised Appeal Brief. Reference to the specification by page and line numbers has been added to the explanation of the invention. It is believed that an explicit reasons why the claims did not stand or fall together was present in the brief but some revisions have been made to those reasons more apparent.

Dated: October 27, 2004

Respectfully submitted,

By Edward A. Meilman  
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**APPELLANT'S BRIEF**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

This brief is in furtherance of the Notice of Appeal, filed in this case on June 1, 2004. It is transmitted in triplicate and contains items under the following headings as required by 37 C.F.R. § 1.192 and M.P.E.P. § 1206:

- I. Real Party In Interest
- II Related Appeals and Interferences
- III. Status of Claims
- IV. Status of Amendments
- V. Summary of Invention
- VI. Issues
- VII. Grouping of Claims
- VIII. Arguments
- IX. Claims Involved in the Appeal
- Appendix A Claims

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Murata Manufacturing Co., Ltd.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

There are 6 claims pending in application. All are the subject of this appeal. No claims have been cancelled during prosecution.

IV. STATUS OF AMENDMENTS

All proposed amendment during prosecution have been entered.

V. SUMMARY OF INVENTION

Solders have conventionally been composed of tin and lead but in consideration of the environment, solders which are lead free have been developed. However, soldered articles using lead free solders which mainly contain tin invite electrode (conductor) leaching upon soldering. In addition, the tin diffuses into the conductor where the articles are left at high temperatures or are subjected to heat aging, which results in a deterioration of the electrical characteristics and the mechanical characteristics of the electronic devices and electronic parts containing such conductors. (Page 1, line 5 to page 2, line 2)

The present invention is based on the discovery that by appropriately limiting the elemental composition of the solder and the amounts of the elements employed, resistance to conductor leeching upon soldering or upon heat aging after soldering can be realized and the resulting electronic devices and parts have their characteristics deteriorated to a lesser degree. The solder contains 0.5 to 1% by weight of copper and at least 90.5% of tin and contains at least one of cobalt, iron, manganese and palladium in specified amounts. (Page 2, lines 4-8; page 4, lines 4-10; page 7, lines 16-18; original claim 1).

#### VI. ISSUES

Whether the claims are obvious under 35 U.S.C. § 103 over JP 2000190090 (hereinafter JP '090) or Carey (U.S. 6,080,497), each of the these references being considered individually.

#### VII. GROUPING OF CLAIMS

The claims do not stand and fall together and arguments supporting the separate patentability of each claim group as required by M.P.E.P. § 1206 are presented in the next section.

#### VIII. ARGUMENT

The invention about which this appeal is concerned with a lead free solder and a soldered article using that solder. By appropriately selecting the components in the solder and the amounts of the components, the appellants determined that the solder and the resulting soldered article were more resistant to electrode leeching upon soldering or upon heat agent after soldering and thereby resisted deterioration. A problem with

the lead free solders mainly containing tin of the prior art is that they invite electrode (conductor) leeching upon soldering and the tin diffuses into the conductors when the articles are left at high temperatures or heat aged.

The application text discloses three (3) solder compositions. However, the claims on appeal are limited to one of those solders and its use. The other two solders have been made the subject of other applications since the prior art considerations applicable thereto is different from the prior art considerations relied on by the Examiner in this case.

More particularly, the claims on appeal relate to a lead free solder containing at least one member of the group of 0.1-1% (preferably 0.4-0.5%) cobalt, 0.01-0.2% (preferably 0.05-0.1%) of iron, 0.01 to 0.2% (preferably 0.05-0.1%) of manganese and 0.01-0.2% (preferably 0.4-0.6%) of palladium; 0.5 to 1% of copper and at least 90.5% of tin. The appealed claims also relate to a soldered article containing a transition metal conductor and being joined through the solder.

### **1. JP '090 Does Not Render The Claimed Invention Obvious**

JP '090 teaches that copper-tin, antimony-tin and silver-tin lead free solders are known but suffer from the disadvantage that their melting temperature is too high (translation paragraph 0005). In order to lower the melting point of a solder containing only copper and tin, as well as raise its mechanical strength and lessen heat damage to electronic parts at the time of soldering, the reference teaches the addition of bismuth and/or indium to the solder. In addition, small amounts of nickel, germanium, palladium, gold, titanium or iron can be added into the bismuth and/or indium

containing solder (translation paragraph 0010). JP '090 teaches that if the amount of bismuth and/or indium is less than 1% by weight, the effect of lower the melting point of the copper-tin solder will not be realized (translation paragraph 0013).

In addition, small amounts of nickel, germanium, palladium, gold, titanium or iron can be added into the bismuth and/or indium containing solder (translation paragraphs 0011). While the reference teaches that small amounts of nickel, etc., can be added to the bismuth and/or tin solder, there is no teaching about the effect, if any, that these other elements may have if added to a copper-tin solder which does not contain the bismuth and/or indium.

JP '090 thus teaches a solder alloy which must include bismuth and indium as essential components. Neither are employed in the present invention. The claims on appeal are "consisting essentially" claims and JP '090 teaches that Bi and In alter a basic characteristic of the solder. Hence, both are excluded from the scope of the appealed claims. There is no teaching or suggestion that either the bismuth or the indium can be eliminated nor is there a motivation to do so. Accordingly, the Japanese reference cannot render the claimed invention obvious.

The Examiner has sought to avoid the foregoing by noting that "the instant specification does not exclude Bi (see pages 8-9 of the instant specification)." That is a misreading of what was said. The issue is what the claims cover, and not what the specification discloses. This is particularly pertinent here where, as noted above, the specification discloses a number of different solders but not all are being claimed in this application. The claims under consideration exclude Bi.

Clearly, JP '090 does not render the claimed invention obvious.

## **2. There are additional reasons that JP '090 Does Not Render Claims 2 and 3 Obvious**

With respect to appealed claims 2 and 3, while the Japanese reference generally refers to soldering, there is no disclosure in the reference of using any of the solders there disclosed in connection with a transition metal conductor which is liable to spread in molten tin nor a solder in which the transition metal conductor is at least one of Cu, Ag, Ni, Au, Pd, Pt, Zn or alloys thereof. Silence in a reference is not an adequate disclosure of facts to justify a rejection under § 103. *In re Burt*, 148 USPQ 548 (CCPA 1966); *In re Newell*, 13 USPQ2d 1248, 1250 (Fed. Cir. 1989).

Clearly, JP '090 does not render the claimed invention obvious.

## **3. Carey Does Not Render The Claimed Invention Obvious**

The Carey patent relates to corrosion resistant copper metal coated with an alloy of tin which can contain as little as 75% tin (col. 23, line 25), although the preferable amount is apparently at least 90%.

The description of Carey's tin alloy composition is set forth in columns 27 to 30. Those tin alloys contain tin and one or more of fourteen (14) elements, one of which is even lead! None of the specific tin alloys described in the patent fall within the scope of the instant claims. The apparently preferred compositions (col. 30, lines 6-29) do not contain copper.

There are many millions of combinations that fall within the scope of the Carey disclosure, even before considering amount of each element. Even if one were by accident to choose the elements of the instant claims, amounts outside the ranges in the appealed claims could be chosen. For instance, iron could be present in excess of the 0.2% by weight maximum of the instant claims. The Carey disclosure thus includes tens of millions, if not hundreds of millions, of compositions outside the scope of the claims under consideration here. To realize a composition having the same elements and amounts as the instant claims, even by accident, would be serendipity.

To overcome this deficiency in Carey, the Examiner has taken the position that the “disclosed genius would have rendered the species prima facie obvious” and has cited that some cases involving as few as four (4) possibilities (Final Rejection, page 4). However, the Federal Circuit has recently pointed out that a disclosure of millions of compounds does not render a claim to a small number of compounds obvious. *In re Baird*, 29 USPQ2d 1550 (Fed. Cir. 1994). “The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious.” *Id.* at 1552. The cases cited by the Examiner in support of a different position, to the extent relevant, are not to the contrary as they involve references in which the number of possibilities was much more limited. The Examiner has not pointed to that something more which *Baird* requires.

It is well established that a shotgun disclosure (as in Carey) is insufficient to render an invention such as claimed here obvious. As stated



by the CCPA in *In re Luvisi*, 144 USPQ 646 (1965), quoting an earlier Board of Appeals decision,

The likelihood of producing a composition such as here claimed from a disclosure such as shown by the ...patent would be about the same as the likelihood of discovering the combination of a safe from a mere inspection of the dials thereof. (emphasis by the Board)

The Carey disclosure of many millions of possibilities is, at the very best, an invitation to experiment, without any disclosure which suggests the lead free tin solder claimed in this application.

There is clearly no motivation to manipulate the Carey disclosure to realize the claimed solder. There is no guidance about which elements to select and which to ignore, or how to adjust concentrations.

Clearly, Carey does not render the claimed invention obvious.

#### **4. There are additional reasons that JP '090 Does Not Render Claims 5 and 6 Obvious**


With particular reference to appealed claims 5 and 6, there is no suggestion to pick only one member of the group. Silence in a reference is not an adequate disclosure of facts to justify a rejection under § 103. *In re Burt*, 148 USPQ 548 (CCPA 1966); *In re Newell*, 13 USPQ2d 1248, 1250 (Fed. Cir. 1989). These claims are also unobvious.

IX. CLAIMS INVOLVED IN THE APPEAL

A copy of the claims involved in the present appeal is attached hereto as Appendix A.

Dated: October 27, 2004

Respectfully submitted,

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## APPENDIX A

### Claims Involved in the Appeal of Application Serial No. 10/087,742

1. A lead-free solder consisting essentially of:
  - at least one selected from the group consisting of 0.01 to 1% by weight of Co, 0.01 to 0.2% by weight of Fe, 0.01 to 0.2% by weight of Mn, and 0.01 to 2% by weight of Pd;
  - 0.5 to 1% by weight of Cu; and
  - 90.5% by weight or more of Sn.
2. A soldered article comprising an article containing a transition metal conductor and being joined through a solder, said transition metal conductor being liable to spread in molten Sn, wherein said solder is a lead free solder according to claim 1.
3. A soldered article according to claim 2, wherein said transition metal conductor comprises at least one selected from elementary substances or alloys thereof of the group consisting of Cu, Ag, Ni, Au, Pd, Pt and Zn.
4. A lead-free solder according to claim 1, consisting essentially of:
  - at least one selected from the group consisting of 0.4 to 0.5% by weight of Co, 0.05 to 0.1% by weight of Fe, 0.05 to 0.1% by weight of Mn, and 0.4 to 0.6% by weight of Pd;
  - 0.5 to 1% by weight of Cu; and

90.5% by weight or more of Sn.

5. A lead-free solder according to claim 4 containing only one member of said group.

6. A lead-free solder according to claim 1 containing only one member of said group.